ILMU KELAUTAN. *Maret 2008. Vol. 13 (I): 13 -18* _____ *ISSN 0853 - 7291*

Aplikasi Teknologi Geomatika untuk Pemetaan Penurunan Tanah (Land Subsidence) di Pesisir Kota Semarang

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Abstrak

Beberapa fenomena alam di kawasan pesisir dan kemudian menjadi bencana alam yang terjadi dalam kehidupan sehari hari diantaranya banjir, rob, longsor, gunung meletus, tsunami dan yang terjadi di Kota Semarang khususnya, adalah penurunan tanah (land-subsidence). Penelitian diiakukan dengan melakukan pengukuran perubahan ketinggian tanah berdasarkan 60 Titik Tinggi Geodesi (TTG-Bakosurtanal) maupun Bench Mark (BM) yang ada dikota Semarang dan data posisi koordinat masing-masing dengan GPS (Global Positioning System). Data geodetik yang diperoleh di transformasi menjadi data numerik, dan proses analisa geo-statistik diiakukan dengan metoda Kriging memakai perangkat lunak ER_Mapper 6.4 (Licensed user) dan Arc_GIS. Di samping data hasil pengukuran dilapangan, digunakan juga data Spaceshuttle Radar for Terrain Model (SRTM) untuk membentuk citra kontur 3 dimensi, juga menggunakan data citra Landsat_ETM. Berdasarkan data pengukuran yang diiakukan di lapangan dan rangkaian analisis spasial maka dapat dibuat plot laju penurunan tanah dan diketahui bahwa laju penurunan tanah Kota Semarang berkisar antara 1-9 cm/tahun, sehingga memerlukan pemetaan ulang, evaluasi tata ruang dan peraturan daerah.

Kata kunci: penurunan tanah, kawasan pesisir, geo-statistik

Abstract

Several natural phenomena at coastal zone that later become natural disaster are flooding, high water-tide flood (locally known as "rob"), land slide, mount eruption, tsunami waves and specific natural phenomena that happened at Semarang coastal city is land-subsidence. Aims of the research are field measurement of actual land-subsidence, by means of land height differences by time and built a spatial plot and data base. Field measurement was done with measurement of land height differences by means of land-height differences based 60 Geodetic Land Height positions set by Indonesian Bireau of Land Mapping and private Bench Mark (BM) at Semarang, with its geodetic positions by GPS (Global Positioning System). Both field and geodetic data collected was then transformed into a numeric series of data to be processed for geostatistic known as Kriging method become a raster layer data, that later used for spatial analysis using ER_Mapper 6.4 (Licensed

user) and Arc_GIS software. Geodetic datum used was WGS84 on UTM map projection. Beside the Held data that was transformed into a arster layer data, a Spaceshuttle Radar for Terrain Model (SRTM) data for contur and 3 dimention analysis and a Landsat_ETM satellite data was also used as value added to the data (metadata). Based on the analysis of field data measurement and spatial plot it is revealed that the rate of land-subsidence at Semarang ranged 1-9 cm/year, widely distributed throughout the city, espescialiy at the most densed populated zone. Therefore remapping as well as re-evaluation of the City Spatial Planning and Regulations was inevitable.

Keywords: land subsidence, coastal zone, geostatistic